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Panel of Experts

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High Level Panel of Experts on Food Security and Nutrition

Extract from the Report¹ *Food losses and waste* *in the context of sustainable food systems*

Summary and Recommendations

The issue of global food losses and waste has recently received much attention and has been given high visibility. According to FAO, almost one-third of food produced for human consumption – approximately 1.3 billion tonnes per year – is either lost or wasted globally: their reduction is now presented as essential to improve food security and to reduce the environmental footprint of food systems.

In this context, the Committee on World Food Security (CFS), in its Thirty-ninth Session (October 2012) requested the High Level Panel of Experts on Food Security and Nutrition (HLPE) to undertake a study on “Food losses and waste in the context of sustainable food systems” to be presented to the CFS Plenary in 2014.

The very extent of food losses and waste invites to consider them not as an accident but as an integral part of food systems. Food losses and waste are consequences of the way food systems function, technically, culturally and economically. This report analyses food losses and waste in a triple perspective: a systemic perspective, a sustainability perspective, including the environmental, social and economic dimensions of sustainability, and a food security and nutrition perspective, looking at how food losses and waste relate to the various dimensions of food security and nutrition.

Main findings

Scope and extent of food losses and waste

1. Food losses and waste have been approached by two different angles: either from a waste perspective, with the associated environmental concerns, or from a food perspective, with the associated food security concerns. This duality of approaches has often led to confusions on the definition and scope of food losses and waste, contributing to unreliability and lack of clarity of data.
2. This report adopts a food security and nutrition lens and defines *food losses and waste* (FLW) as “a decrease, at all stages of the food chain from harvest to consumption, in mass, of food that was originally intended for human consumption, regardless of the cause”. For the purpose of

¹ HLPE, 2014. Food losses and waste in the context of sustainable food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2014. Full report forthcoming at www.fao.org/cfs/cfs-hlpe.

terminology, the report makes the distinction between *food losses*, occurring before consumption level regardless of the cause, and *food waste*, occurring at consumption level regardless of the cause. It further proposes to define *food quality loss or waste* (FQLW) which refers to the decrease of a quality attribute of food (nutrition, aspect, etc.), linked to the degradation of the product, at all stages of the food chain from harvest to consumption.

3. There are numerous studies on FLW with diverse scopes and methodologies, making them difficult to compare. At the global level, recent studies use the data compiled for the FAO report published in 2011, which estimated global FLW at one third of food produced for human consumption in mass (equivalent to 1.3 billion tonnes per year), or one quarter as measured in calories.
4. The distribution of FLW along the food chain varies greatly by region and product. In middle and high-income countries, most of the FLW occur at distribution and consumption; in low income countries, FLW are concentrated at production and post-harvest. Per-capita FLW peaks at 280–300 kg/cap/year in Europe and North America and amounts to 120–170 kg/cap/year in sub-Saharan Africa and South/Southeast Asia.
5. Different definitions, different metrics, different measurement protocols and the lack of standards for data collection adapted to different countries and products, makes it difficult – and sometimes impossible – to compare studies, systems and countries. There is also no agreed method to evaluate the quality of data, method and numbers produced. This situation is a huge barrier to understanding and identifying the causes and extent of FLW, the potential for solutions, the priorities for action and the monitoring of progress in reducing FLW. This is why there are currently strong calls for the development of global protocols to measure FLW, taking into account the large number of variables and country specificities, towards a harmonization of definitions and measurement methods, with a view to improve the reliability, comparability and transparency of data.

Impacts of FLW on food security and nutrition and on the sustainability of food systems

6. FLW impact both food security and nutrition and the sustainability of food systems. This report looks at FLW in the context of sustainable food systems, and adopts the following definitions, as adapted from a range of other definitions.
7. A *food system* gathers all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the outputs of these activities, including socio-economic and environmental outcomes.
8. A *sustainable food system (SFS)* is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.
9. FLW impact food security and nutrition by three main ways. First, a reduction of global and local availability of food. Second, a negative impact on food access, for those involved in harvest and post-harvest operations and who face FLW-related economic and income losses, and for consumers due to the contribution of FLW to tightening the food market and raising prices of food. Third, a longer-term effect on food security results from the unsustainable use of natural resources on which the future production of food depends.
10. Two additional relationships between FLW and food security and nutrition are less explored in the literature. One relates to quality and nutrient losses all along food chains, including at consumer level, which negatively impact nutrition. The second relates to the characteristics a food system should have to assure the “stability” dimension of food security, especially given the “variable” nature of food production and consumption. FLW may be indissociable from the need for appropriate “buffering” mechanisms – and some degree of redundancies – to handle the sometimes very high variability of production and consumption in time and in space.
11. FLW also impact the sustainability of food systems in all the three dimensions: economic, social and environmental. They induce economic losses and reduce return on investments. They impede development and hinder social progress. They have an important impact on the environment both from the superfluous use of resources used to produce the food lost and wasted, and from the local and global environmental impacts of putting food waste at disposal in landfills, including the emissions of methane, a potent greenhouse gas.

Organizing the description of causes of food losses and waste: micro, meso and macro causes

12. Identification of causes of FLW is primordial to identification of solutions to reduce FLW, and priorities for action. FLW can result from a very wide range of antecedents, ranging from biological, microbial, chemical, biochemical, mechanical, physical, physiological, technological, logistical, organizational, to psychological and behavioural causes – including those induced by marketing, etc. The importance of these antecedents vary greatly according to the produce and the context, and the stage of the food chain considered. Some studies have identified as much as several hundreds of different individual causes of FLW.
13. Identifying the causes of FLW requires an integrated perspective along the food chain, and to consider any action at one specific stage not in isolation but as part of a whole. Just as in a conveyor belt, actions at one stage of the food chain can affect the whole chain. It is important not to confuse “where” a specific loss or waste is occurring, with its “cause”. FLW happening at one stage of the food chain can have their cause at another stage. For instance, some part of FLW happening at retail and consumption stages can be traced back to causes at harvest or even pre-harvest stages. Lack of care in the manipulation of fruits during harvest and packaging, which in turn can be related to poor work conditions, can reduce their shelf-life and cause retail-level loss or consumer waste. Conversely, fruits can be left to rot in the field because of a retailer’s decision to lower its buying price or interrupt a contract.
14. Causes are often interrelated: rarely a loss or a waste appearing at one stage of the chain, for a particular reason, is solely dependent on one specific cause.
15. This report proposes to disentangle the complexity and diversity of causes in organizing their description amongst three different levels
 - i. First, “micro-level” causes of FLW. These are the causes of FLW, at each particular stage of the food chain where FLW occurs, from production to consumption, that result from actions or non-actions of individual actors *of the same stage*, in response (or not) to external factors.
 - ii. Second, “meso-level” causes of FLW. These include secondary causes or structural causes of FLW. A meso-level cause can be found at another stage of the chain as to where FLW happen, or result from how different actors are organized together, of relationships along the food chain, of the state of infrastructures, etc. Meso-level causes can contribute to the existence of micro-level causes.
 - iii. Third, “macro-level” causes of FLW. This higher level accounts for how food losses and waste can be explained by more systemic issues, such as a malfunctioning food system, the lack of institutional or policy conditions to facilitate the coordination of actors (including securing contractual relations), to enable investments and the adoption of good practices. Systemic causes are those that favour the emergence of all the other causes of FLW, including meso and micro causes. In the end, they are a major reason for the global extent of FLW.

Micro level causes of food losses and waste along food chains

16. Micro-level causes can be found all along the food chain, and are the direct, immediate reasons for FLW taking place at a certain point of the chain, resulting from actions (or non-action) at the same point of the chain, on how individual actors deal with various factors potentially leading to FLW.
17. Poor harvest scheduling and timing, and rough, careless handling of the produce, are both major contributors to FLW.
18. All along the food chain, inadequate or lack of storage conditions and, for perishable products, poor temperature management are key factors leading to FLW.
19. Transport can be a major cause of FLW: by introducing a time span between production and consumption, of particular importance for fresh products and by bringing additional risks of mechanical and heat injury. Time spent because of transport can also lead to decrease of nutritional contents.
20. Conditions within the retail outlet (temperature, relative humidity, lighting, gas composition, etc.) and handling practices have an effect on quality, shelf-life and acceptability of the product.

21. FLW at consumer stage, at household level but also in catering and other food services, are particularly important in developed countries. They are mainly driven by behavioural causes, including habits of food buying, preparation and consumption, as well as time planning and coordination. They are influenced by marketing techniques which encourage consumers to buy more than they need.

Meso and macro-level causes of FLW

22. Very often causes of FLW are found at “higher” meso- and macro-levels, which lead to FLW (and their micro-causes) happening at various stage of the chain.
23. At meso-level, the lack of equipment and/or of good practices, inadequate organization, coordination and communication between food chain actors (e.g. transformation that renders the product useless at a later stage of the chain, etc.), inadequate infrastructure, maladapted economic conditions along the food chain (product unmarketable, etc.) are major causes of FLW at various parts of the food chain. More macro-level, systemic causes include the absence of a good, enabling environment to support coordination between actors, investment and improvement of practices.
24. Pre-harvest conditions and actions in the field can indirectly lead to losses at later stages in the chain, as production and agronomic practices influence quality at harvest, suitability for transport and shipping, storage stability and shelf-life after harvest.
25. The retailers influence the activities of supply chains by dictating the quality of the produce to be supplied and displayed in their outlets. Quality standards (as to shape, size, weight) imposed by the processors, retailers or target markets can lead to produce not meeting them remaining un-harvested.
26. Inadequate information and bad anticipation of market conditions (level of demand, prices) can also lead to produce remaining un-harvested.
27. In many low-income countries, there is considerable food loss due to lack of storage capacity and poor storage conditions as well as lack of capacity to transport the produce to processing plants or markets immediately after harvesting. There are also too few wholesale, supermarket and retail facilities providing suitable storage and sales conditions for food products. Wholesale and retail markets in developing countries are often small, overcrowded, unsanitary and lack cooling equipment.
28. Poor transportation infrastructure is another important meso-cause of FLW.
29. Even with adequate equipment, lack of implementation of good practices all along the food chain is a major cause of food losses and waste.
30. Confusion arising from the existence and poor understanding of different food date labels are a major, indirect cause of FLW at the retail and consumer levels. Consumers tend to assume that these dates are linked to food safety when in reality they are more often based on food quality (which will deteriorate over time without necessarily becoming a health hazard). Many kinds of date labels coexist, some of them not intended to inform consumers but rather to help retailers manage their stock. Other date labels are directed to consumers, but their purpose can be very different whether the indicated date is related to food safety rules, or related to marketing strategies to protect consumers’ experience of a product in the view to safeguard its reputation, often with a huge food safety margin. Consumers get lost in this multitude of date labels. Furthermore, date labeling is a major cause of FLW and economic loss at the retail level as retailers often anticipate dates to preserve their good image.
31. At macro-level, the ability of the actors of the food chain to reduce FLW depend on the surrounding policies and regulatory frameworks. Many regulations affect FLW, including policies that control the use of surplus food for humans or for animal feed; policies or bans on fish discards; food hygiene regulations; food labelling and packaging regulations; waste regulations and policies. Other regulations might not have a direct impact on FLW, but on the potential to use them as feed or energy.

Micro solutions to reduce food losses and waste

32. The identification of broad categories and levels of causes enables to design pathways for all stakeholders to identify and implement solutions to reduce FLW.

33. The review of “micro” causes of FLW at each stage of food chains leads to the identification of potential solutions and of actors to implement them. At each stage of the food chain, some solutions can be implemented by single actors to address specific causes of losses and waste.
34. Micro-level solutions at harvest and post-harvest stages involve improved practices, adoption of technical innovations, investments, or a combination of these. When appropriately applied, good agricultural practices and good veterinary practices at the primary stage of production as well as good manufacturing practices and good hygienic practices during food processing can protect food from contamination or damage. A key intervention all along food chains is to improve storage conditions. Various solutions have been already successfully implemented in many places.
35. Modifying consumers’ behaviour is also important. It involves direct communication and awareness raising on the importance of reducing food waste. Stressing the civic responsibility for reducing FLW is important. Consumers may also need technical options, such as better, smart packaging adapted to different conditions of use, or the promotion of the “doggy bag” practice in restaurants. It also requires the support and cooperation of the food industry and retailing, for instance to improve the clarity of food date labelling and to provide advice on food storage, or to ensure that an appropriate range of pack or portion sizes is available to meet the needs of different households

Meso-level solutions

36. Micro-level solutions can be supported and enhanced by actions at meso-level, often involving several actors altogether, public and private.
37. They often require investments, both public and private. This is particularly the case when the main solutions reside in improvement of logistics. For perishable products, management of temperature and absence of delays are two vital issues that require investments in infrastructures (energy for cold chains, roads for transportation). Innovation and adaptation of technical solutions to local conditions are essential for success. Cold chain management in perishable foods supply chains offers a very good example of potential solutions and what is needed to implement them in locally adapted ways.
38. For many products, particularly for perishable ones, transformation can be a way to reduce FLW and improve resistance to transport and storage, and increase shelf life. Investment in food processing infrastructure, including packaging, can be seen as a huge opportunity to contribute to improved situations of food security, especially in sustainable ways to fulfil the growing demands of metropolitan areas.
39. Capacity development in the form of education, training and extension services for farmers and all actors across the food chain is a key tool for reducing food losses and waste.
40. There are initiatives from government and development partners in developing countries to improve the livelihoods of women farmers through value addition and marketing of perishables food crops such as fruits and vegetables. These initiatives have two-pronged benefits – economic empowerment of rural women and reduction of post-harvest losses in the perishable commodities.
41. The increasing inclusion in annual corporate businesses reports of a section detailing the environmental and social impacts of their activities could lead to more sustainable food systems and less FLW. Businesses can commit and report (i) on monitoring of food losses and waste in their activities, (ii) on reducing food losses and waste in their activities, (iii) support activities which lead to reduction of FLW, with their suppliers, at consumer level or elsewhere.
42. The standardization of the products offered to consumers is a major cause of FLW in modern retailing systems. In traditional systems products gradually lose their economic and exchange value along with their quality, as defined by the FLWQ concept. They are generally still sold or exchanged, but at gradually lower prices. In modern, standardized systems, products are rather defined as marketable or not. They “suddenly” lose all their economic value when they are no more of the minimum quality considered as marketable – which is often not linked to their edibility – as illustrated by the confusion on date labelling. Alternative distribution systems such as food banks preserve them an edible value.

Macro-level (systemic) solutions

43. Solutions at micro- or meso-level can be enabled, supported and enhanced by action at macro-level. Some solutions can only be implemented if they are accompanied by action at “macro” level. This includes specific policies against FLW or considering FLW in other sets of policies. As mentioned above, reducing FLW often involves improving infrastructures, particularly transport, energy and market facilities. This requires government action, with often involvement of local authorities and also of the private sector. Decisions and policies would deserve to be based on sound cost-benefit analysis, so as for example to ensure that the right incentives or corrective measures are put in place.
44. Many of the causes of FLW – and therefore the appropriate solutions – are due to behavioural or economic choices, which seem rational at one stage of the chain, but may lead to FLW when the rest of the food chain is considered. For example, the decision of a farmer to plant a larger field at the expense of not necessarily harvesting the whole of it depending on market conditions; the decision of food chain agents to overbuy food with respect to potential sales and their variability; supermarkets needing to show a situation of abundance of products to attract clients, etc. Tackling these causes of food losses and waste will imply addressing their underlying economic and behavioural drivers, understanding their reasons, and finding a “substitution” to the different “functions” that these actions (which may end up in creating FLW) “ensure” for the different actors.
45. Solutions to be implemented at meso and macro level generally require concerted and collective action and measures. Prior identification of potential winners and losers across the whole food system, and the design of appropriate incentive or compensation mechanisms, is key to the success of implementation. This includes in particular assessing whether the poor producers and consumers gain from FLW reduction. It should also consider how the “FLW-to-be-reduced” was originally used (e.g. was it used as feed for animals or thrown away?). To avoid unintended consequences of FLW reduction strategies, policymakers and stakeholders should consider all the impacts of the proposed changes.

A growing set of initiatives towards coordinated actions to tackle FLW

46. There are a growing number of initiatives around the world that focus on reducing FLW, at national, regional and local levels. They have all as common denominator the perspective of gathering public and private actors, in a multi-stakeholder setting, often with a significant engagement of the private sector.
47. Some governments have started to define specific targets for FLW reduction. However few governments have put in place specific policies to reduce FLW, less even with a systemic approach and integrated programmes. To date, main drivers for FLW targets are generally found outside the perimeter of food policies, such as in waste management policies leading to reducing the volume of waste, including packaging waste, and in resource use efficiency policies leading to optimize, in analogy to the energy sector, the amount of inputs and resources (including raw food products) in production and consumption.
48. Reducing food losses and waste requires identifying causes and selecting potential solutions adapted to local and product specificities. It includes evaluating potential costs and benefits of various options for different actors along the chains. The implementation of the selected solutions generally requires the support or involvement of other actors, inside the food chain or at broader levels. This often calls for coordinated action of multiple stakeholders. It also calls for actions at policy level, to improve policies having an impact on FLW, or to build specific FLW reduction policies.

RECOMMENDATIONS

Food losses and waste (FLW) impact both food security and nutrition and the sustainability of food systems, in their capacity to ensure good quality and adequate food for this generation and future generations. It calls for all stakeholders – States, international organizations, private sector and civil society – to recognize food security and nutrition as a central dimension of sustainable food systems and to address collectively FLW to improve the sustainability of food systems and to contribute to food security and nutrition.

According to FAO, nearly one-third of food produced for human consumption – approximately 1.3 billion tonnes per year – is either lost or wasted globally. The HLPE makes the following recommendations as a way of making serious progress to reduce this figure.

The HLPE recommends that States and international organizations better integrate food chains and food systems perspectives in any food security and nutrition strategy or action. Reduction of FLW should be systematically considered and assessed as a potential means to improve agricultural and food systems efficiency and sustainability towards improved food security and nutrition. Direct and indirect causes of FLW in a given system should be analysed to identify hotspots where it would be most efficient to act.

The HLPE recommends undertaking four parallel mutually supportive tracks, in an inclusive and participatory manner:

1. Improve data collection and knowledge sharing on FLW.
2. Develop effective strategies to reduce FLW, at the appropriate levels.
3. Take effective steps to reduce FLW.
4. Improve coordination of policies and strategies in order to reduce FLW.

1) Improve data collection and knowledge sharing on FLW

All Stakeholders should

1a) Agree on a shared understanding, definition and scope for FLW.

1b) Improve the collection, transparency and sharing of data, experiences and good practices on FLW at all stages of food chains.

FAO should

1c) Consider developing common protocols and methodologies to measure FLW and analyze their causes. This should be done through an inclusive and participatory process, taking into account product, country and all stakeholders' specificities and building upon FAO's experience.

1d) Invite all stakeholders, international organizations, governments, private sector and civil society to collect and share data on FLW in a coherent and transparent manner at all stages of food chains.

2) Develop effective strategies to reduce FLW, at the appropriate levels

States should

2a) Convene an inclusive process to identify hotspots, causes of losses and waste at different levels (see Appendix 1), potential solutions (see Appendix 2) and levels of intervention. This requires identifying the actors who will directly implement solutions, individually or collectively, identify the costs they will bear, as well as potential benefits and beneficiaries. It also requires identifying constraints (including systemic constraints) and how they would be addressed (infrastructure, technologies, changes of organization in the food chain/system, capacity building, policies and institutions).

2b) Determine a plan of action in a manner that includes all stakeholders.

FAO should

2c) Support these national processes in collaboration with partners to devise methodological guidance adapted to countries' specificities, and needs and priorities of various actors.

3) Take effective steps to reduce FLW

States should

3a) Invest in infrastructure and public goods to reduce FLW and to ensure sustainable food systems such as storage and processing facilities, reliable energy supply, transport, appropriate technologies, improved access and connection of food producers and consumers to markets.

3b) Implement an adequate framework including regulation, incentives and facilitation so that the private sector (e.g. wholesaler, retailer, catering and other food services) and consumers take robust measures to tackle unsustainable consumption patterns. This framework should also ensure that the private sector better incorporates negative externalities of their activities such as damage to natural resources.

3c) Take measures to support smallholders to reduce the FLW by organizing themselves in ways that yield economies of scale and allow them to move towards high value activities in the food supply chain.

3d) Create an enabling environment for the reduction of FLW including by encouraging sustainable patterns of consumption among the population, as well as food and non-food investments promoting food security.

3e) Encourage sector-based audits of FLW.

3f) Reform public food procurement policies to reduce and minimize FLW while ensuring food safety.

3g) Design and introduce procedures to ensure higher corporate accountability standards for FLW, and monitor reductions in FLW in the food processing and retailing sectors.

States and other stakeholders, including international organizations, private sector and civil society should

3h) Carry out training and capacity building to strengthen the coordinated use of appropriate technologies.

3i) Promote experimentation and the exchange of good practices regarding FLW.

3j) Recognize the plurality of food systems in their diverse contributions to FLW and various potentials to reduce them.

3k) Enable and support multi-stakeholder initiatives to improve governance along food chains and organize collective understanding and action to reduce FLW.

3l) Invest in research and development to minimize FLW.

3m) Improve the dissemination of accurate information and advice to consumers to minimize FLW.

3n) Encourage civic engagement of all actors, including consumers, to act concretely to reduce FLW in particular through public campaigns, education of youth and children.

Private sector should

3o) Develop and implement corporate responsibility policies to diminish FLW including by collecting and sharing data on FLW and ensuring that the costs and benefits of FLW reduction are appropriately shared.

3p) Get involved with collective actions and initiatives for reducing FLW, including by mobilizing companies to change their practices in order to reduce FLW in households.

3q) Reform supermarket and food retailer practices such as product standards used to accept or reject farmers produce (e.g. size and shape of foods as well as cosmetic standards for fruit, vegetables, livestock products). This can be done for example by introducing differentiated pricing to prevent economic and nutrition value losses.

National and International research and development organizations should

3r) Increase investment in technological innovations at post-harvest and consumption stages for effective reduction of FLW as well as for adding value to agricultural products in the whole food value chain, for example through the extension of shelf life while protecting nutritional value.

4) Improve coordination of policies and strategies in order to reduce FLW

States should

4a) Integrate FLW concerns and solutions, and a food chain approach, in agricultural and food policies and development programs, as well as in other policies which could impact FLW.

4b) Strengthen the coherence of policies across sectors and objectives (e.g. sustainable food consumption, dietary guidelines, food safety, energy, and waste).

4c) Set targets and introduce enabling economic policies and incentives to reduce FLW, through a “food use-not-waste” hierarchy (i.e. prevention, reallocation of food for feed, recycle for energy through anaerobic digestion, recover for compost, disposal, and ultimately, if no other solution is available, in landfills).

4d) Support efforts for coherence, clarification and harmonization of the meaning and use of food dates labelling, at national as well as international level taking into account the principles of the *Codex Alimentarius*.

4e) Ensure a holistic food chain approach, with adequate research and extension services, including towards small transport, transformation and distribution enterprises.

4f) Support coordination of efforts through multi-stakeholder initiatives, such as the global “Save Food” initiative.

All Stakeholders should

4g) Improve communication, coordination, recognition of efforts needed/made at one stage to reduce FLW at another stage (downstream or upstream).

CFS should

4h) Consider convening an inclusive meeting to share successful experiences, challenges faced and lessons learned from FLW initiatives.

4i) Develop guidelines to assist governments in an assessment of their food systems with a view to reduce FLW.

4j) Raise awareness of the importance of reducing FLW and disseminate this HLPE report to international organizations and bodies.